

What is claimed is:

1. An intraurethral magnetic valve for insertion into the urethra of a person's body to selectively provide fluid discharge therefrom and to spontaneously provide high-pressure relief therefrom, comprising:

a housing having fluid inlet and outlet apertures between which are disposed a valve element having a cylindrical permanent magnet, a fixed nonferromagnetic valve seat, a movable ferromagnetic valve seat having an aperture, and a spring, in which in a closed position said valve element is normally held against said movable valve seat by magnetic attraction to occlude said aperture of said movable valve seat and said spring is normally positioned to hold in sealing engagement said movable valve seat against said fixed valve seat; and

said moveable valve seat being movable responsive to hydrostatic pressure of fluid from said inlet aperture to move said movable valve seat away from said fixed valve seat to provide passage of fluid along one or more gaps along said valve element and movable valve seat, and thereby enable spontaneous fluid discharge via said outlet aperture; and

said valve element being disposed for universal movement within said housing responsive to externally applied magnetic force sufficient to move said valve element from occluding said aperture of said movable valve seat which enables passage of fluid between said inlet and said outlet via said aperture of said movable valve seat, and thereby selectively providing fluid discharge from said housing.

2. The intraurethral magnetic valve according to Claim 1 wherein said housing further comprises a ring providing said inlet aperture, and said ring retains said valve element in said housing during selective fluid discharge.

3. The intraurethral magnetic valve according to Claim 1 wherein said valve element is dimensioned to enable in all possible open positions a maximum of three contact points in said housing.

4. The intraurethral magnetic valve according to Claim 1 wherein said fixed valve seat is sealingly attached within said housing.

5. The intraurethral magnetic valve according to Claim 1 wherein said fixed valve seat and said movable valve seat have planar surfaces sufficiently flat and smooth to form a noncompliant fluid seal with each other at contact forces provided by said spring and at

hydrostatic forces safe for the human bladder.

6. The intraurethral magnetic valve according to Claim 1 wherein said valve element is guided by said fixed valve seat to central alignment with said movable valve seat.

7. The intraurethral magnetic valve according to Claim 6 wherein said fixed valve seat has a plurality of sloping surfaces to guide said valve element toward central axis alignment with said housing and said movable valve seat.

8. The intraurethral magnetic valve according to Claim 6 wherein said fixed valve seat has a single sloping surface to guide said valve element toward central axis alignment with said housing and said movable valve seat.

9. The intraurethral magnetic valve according to Claim 1 wherein said fixed valve seat has a plurality of sloping surfaces cut down and located below any possible contact with said valve element.

10. The intraurethral magnetic valve according to Claim 1 wherein said movable valve seat is made of or plated with biocompatible material, and said side of said aperture facing said outlet aperture is beveled to reduce fluid drag.

11. The intraurethral magnetic valve according to Claim 1 wherein said movable valve seat has a circular depression for concentric alignment with said spring.

12. The intraurethral magnetic valve according to Claim 1 wherein said movable valve seat has a cylindrical surface having a plurality of radially spaced shoulders for central aligning said movable valve seat in said housing, and having a plurality of recesses providing said gaps along said movable valve seat for fluid passage during said spontaneous fluid discharge.

13. The intraurethral magnetic valve according to Claim 1 wherein said movable valve seat and said magnetic valve element have planar surfaces sufficiently flat and smooth to form a noncompliant fluid seal with each other at contact forces provided by attraction of said cylindrical magnet to said movable seat and at fluid pressures normally found in the human bladder.

14. The intraurethral magnetic valve according to Claim 1 wherein said spring is made of or plated with biocompatible material.

15. The intraurethral magnetic valve according to Claim 2 wherein said ring is made of nonferromagnetic biocompatible material, and has a bevel along said aperture of said ring to reduce fluid drag.

16. The intraurethral magnetic valve according to Claim 15 wherein said valve element has edges, and said aperture of said ring has a diameter which limits possible positions of said valve element and prevents edge of said valve element from falling within said aperture of said ring.

17. The intraurethral magnetic valve according to Claim 1 wherein said outlet aperture has one or more flanges for enabling coupling of said housing to a tool for one or more of implanting, extracting, or manipulating said housing in the urethra.

18. A housing for valves, stents, valved stents and other apparatus intended for implantation in the human urethra or other bodily lumen, comprising:

a cylindrical wall having two ends each with apertures; and  
one or more flanges at one of said ends capable of engaging a tool for manipulating said housing in one or more dimensions.

19. The housing according to Claim 18 wherein said housing is composed of nonferromagnetic, biocompatible material.

20. The housing according to Claim 18 further comprising a movable ferromagnetic valve seat and a spring disposed in said housing, wherein said flanges retain said spring in compression against said ferromagnetic valve seat.

21. The housing according to Claim 18 wherein said flanges further comprise means for retaining a spring in compression, and said housing further comprises a movable ferromagnetic valve seat, and a depression in said seat maintaining said spring in concentric relationship with said ferromagnetic valve seat.

22. The housing according to Claim 18 wherein said flanges are two in number and disposed in axially symmetric relationship at said one end of said cylindrical wall.

23. The housing according to Claim 18 wherein said flanges are each crescent shaped.

24. The housing according to Claim 23 wherein said crescent shaped flanges each have concave arches to enable self centering of the tool when engaging said flanges.

25. The housing according to Claim 18 wherein said flanges having flat surfaces that interfere loosely with the tool when engaging said flanges.

26. The housing according to Claim 18 wherein said flanges are incapable of forming fluid seal with the tool when engaging said flanges.

27. A tool for implanting, extracting, manipulating, and irrigating devices, such as valves and other apparatus, within the urethra of a person's body in which said devices have an aperture, comprising:

a tip having one or more flanges to enable insertion of said tip into an aperture of a device having flanges providing a keyed opening alignable with said flanges of said tip, in which rotation of said tip in a first rotational direction locks said tip onto the device and in the opposite rotational direction unlocks said tip from said device; and

a lumen extending through said tip.

28. The tool according to Claim 27 further comprising a cylindrical segment extending from said tip attachable to tubing, in which said lumen extends through said tip and said cylindrical segment.

29. The tool according to Claim 27 wherein said tip further comprises a frustoconical point along which said flanges extend which is receivable in the aperture of the device.

30. The tool according to Claim 27 wherein movement of said tool is coupled to said device via said tip when said tool is locked to said device.

31. The tool according to Claim 27 wherein said flanges comprise:  
two rotational flanges have surfaces for rotationally engaging the flanges of the

aperture of said device; and

two stop flanges limiting rotation of said tip along said rotational flanges when engaging the device.

32. The tool according to Claim 28 further comprising an annular shoulder between said flanges and said cylindrical segment to limit penetration of said tip into said device.

33. The tool according to Claim 32 further comprising a detachable washer along said shoulder in the direction of said tip.

34. The tool according to Claim 33 wherein said washer is conical.

35. The tool according to Claim 33 wherein said washer is sufficiently thick to increase fluid drag at the connection of said tip to said device and insufficiently thick to block fluid leakage at said connection.

36. The tool according to Claim 27 wherein said tip is nonmagnetic and biocompatible.

37. The tool according to Claim 27 wherein said flanges engage said device loosely by interference without friction, threaded fit, or fluid seal.

38. The tool according to Claim 29 wherein said frustoconical point enables the tip to be self-centering on said device.

39. The tool according to Claim 29 wherein said stop flanges provide means for applying torque to said device.

40. The tool according to Claim 31 wherein said stop flanges limit tip rotation within said device to less than 45 degrees.

41. The tool according to Claim 28 wherein said cylindrical segment provides a fixation surface to the tubing of arbitrary length.

42. The tool according to Claim 28 wherein said tubing is attachable to said

cylindrical segment by one of elastic tension or adhesion, or both tension and adhesion.

43. The tool according to Claim 31 wherein said tip further comprises a frustoconical point and said flanges emerge along said tip from said frustoconical point, and said rotational flanges have surfaces defining part of the frustoconical shape of said tip.

44. The tool according to Claim 28 wherein said tubing when attached to said cylindrical segment provides a conduit for bi-directional fluid flow through said lumen.

45. The tool according to Claim 28 further comprising said tubing attached to said cylindrical segment to provide means for extracorporeal manipulation of said tip and said device when locked thereto.

46. The tool according to Claim 28 wherein said cylindrical segment has a plurality of concentric barbs for secure fixation to said tubing.

47. The tool according to Claim 27 wherein said tip is ferromagnetic and biocompatible when said tool is used as an extraction tool.

48. The tool according to Claim 27 wherein said tip is one of a plurality of different tips composed of non-magnetic or magnetic material.

49. The tool according to Claim 27 wherein said tip is dimensioned in accordance with the aperture of said device.

50. A valve comprising:  
a cylindrical housing having ends with first and second apertures;  
a valve seat having an opening in said housing between said ends;  
a valve check normally magnetically attracted to said valve seat to cover said opening and to enabled discharge of fluid between said first and second apertures via said opening by external magnetic force upon said valve check moving said valve check by overcoming said attraction to said valve seat;  
a ring providing said first aperture for retaining said valve check in said housing and limiting the positions of said valve check when moved by said external magnetic force;  
a guide having one or more sloped surfaces for centering said valve check upon said

valve seat and a surface facing said valve seat; and

a spring biasing said valve seat against said surface of said guide, in which said valve seat is displaced from said surface when pressure of fluid upon said seat via said first aperture overcomes said spring bias to enable fluid discharge between said first and second apertures via one or more gaps along said valve check and said valve seat.

51. A method for manipulating devices, such as valves and other apparatus, in the urethra of a patient in which said devices each have an aperture, said method comprising the steps of:

providing a tool having a tip with flanges insertable into an aperture of a device and tubing extending from said tip;

inserting said tip and tubing into said aperture in which said aperture has flanges providing a keyed opening alignable with said flanges of said tip;

rotating said tubing in a first rotational direction to lock said tip onto the device;

inserting and positioning said device locked to said tool in the urethra of a patient by manipulating said tubing;

rotating said tubing in the opposite rotational direction to unlock said tip from said device; and

removing said tubing and tip from the urethra of the patient leaving said device within the urethra.

52. The method according to Claim 51 further comprising the step of:

irrigating said device via said tubing with the aid of a lumen extending through said tip.

53. The method according to Claim 51 further comprising the step of:

back flushing said device via said tubing with the aid of a lumen extending through said tip.

54. The method according to Claim 51 further comprising the steps of:

inserting said tip and tubing in the urethra of the patient;

locating said tip in the aperture of the device;

rotating said tubing in a first rotational direction to lock said tip onto the device; and

removing said device locked to said tool from the urethra of the patient.